

Preface

This monograph provides a largely self-contained and broadly accessible exposition of two cosmological applications of algebraic quantum field theory (QFT) in curved spacetime: a fundamental analysis of the cosmological evolution according to the Standard Model of Cosmology and a fundamental study of the perturbations in Inflation. The two central sections of the book dealing with these applications are preceded by sections containing a pedagogical introduction to the subject as well as introductory material on the construction of linear QFTs on general curved spacetimes with and without gauge symmetry in the algebraic approach, physically meaningful quantum states on general curved spacetimes, and the backreaction of quantum fields in curved spacetimes via the semiclassical Einstein equation. The target reader should have a basic understanding of General Relativity and QFT on Minkowski spacetime, but does not need to have a background in QFT on curved spacetimes or the algebraic approach to QFT. In particular, I took a great deal of care to provide a thorough motivation for all concepts of algebraic QFT touched upon in this monograph, as they partly may seem rather abstract at first glance. Thus, it is my hope that this work can help non-experts to make ‘first contact’ with the algebraic approach to QFT.

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